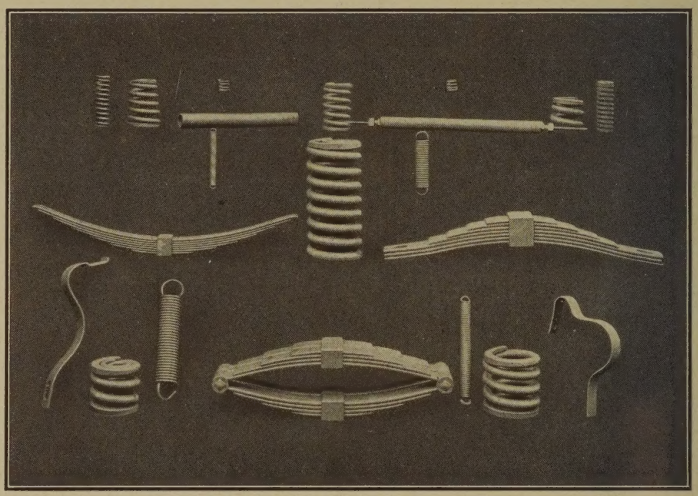
Vol. V MAY, 1911 No. 5

BRILL MAGAZINE



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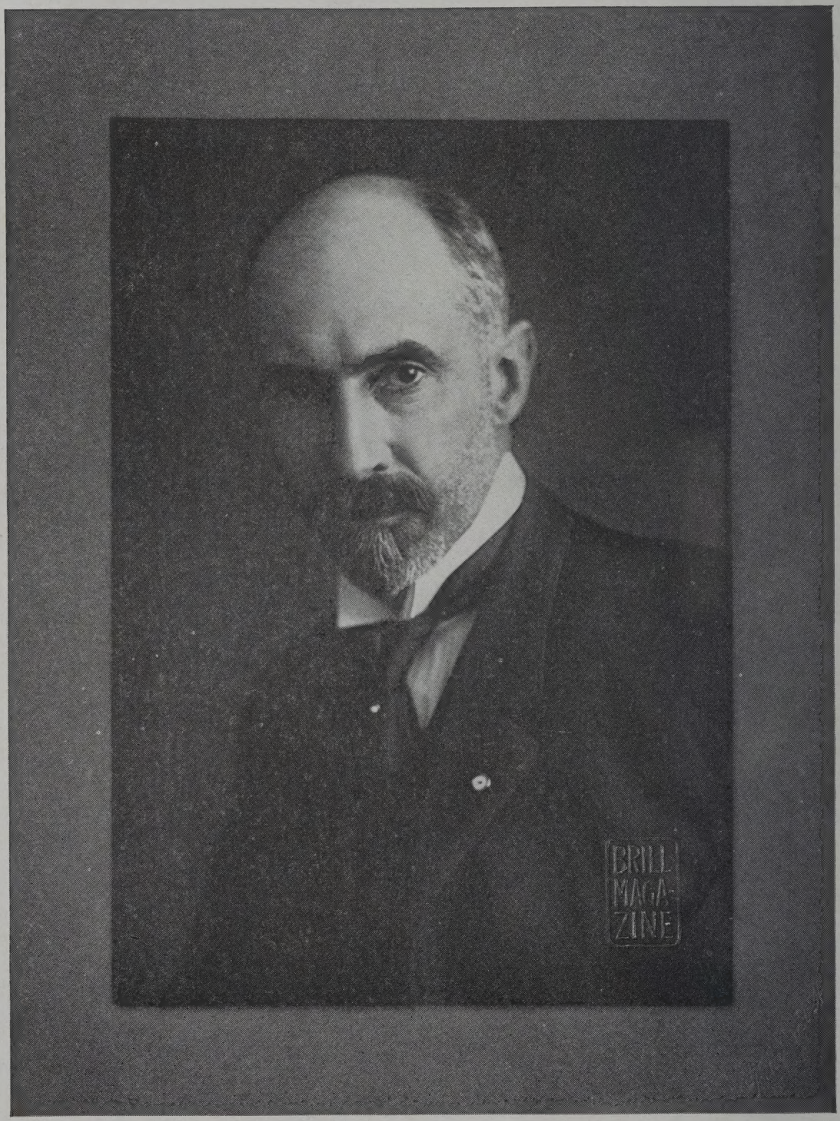
MADE FROM PENNSYLVANIA RAILROAD ANALYSIS STEEL

Brill trucks owe much of their success to Brill springs. They are made from high carbon, low phosphorus steel and each spring is separately tested for deflection under predetermined loads by hydraulic testing machines of the most modern types. The same quality springs made under the same rigid requirements can be obtained for replacements, and the capacity of our spring shop enables us to make prompt deliveries. We make every description of spring for railway cars and trucks, also heavy locomotive driving springs, and are prepared to handle small orders as well as large.

THE J. G. BRILL COMPANY

PHILADELPHIA - - - PENNSYLVANIA



Chas. T. Black

VICE-PRESIDENT AND GENERAL MANAGER
UNITED RAILROADS OF SAN FRANCISCO

BRILL MAGAZINE

Vol. V MAY, 1911 No. 5

CHARLES N. BLACK

[WITH PORTRAIT INSERT]

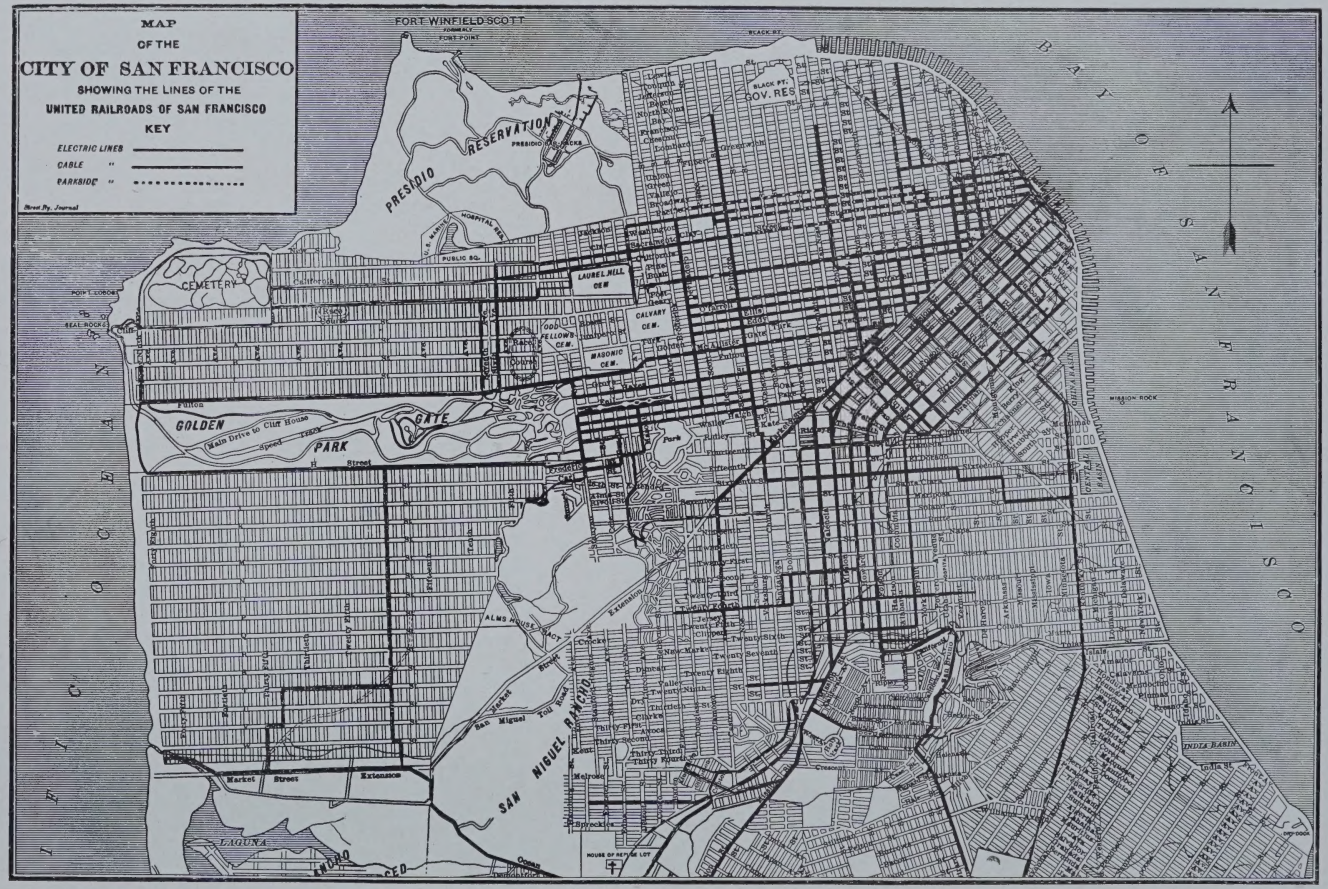
CHARLES NEWBOLD BLACK, vice-president and general manager of the United Railroads of San Francisco, was born in New York City in 1867. He was educated in his native city and later at Princeton University, from which he graduated in the class of 1888 with the degree of A. B., and after a two-years' post graduate course in engineering at the same university, received the degree of E. E. Entering the employ of the Brush Electric Company, of Cleveland, he advanced quickly from one position to another and was superintendent and general electrician when he resigned to take charge of a branch factory in New Haven of the Walker Manufacturing Company, of Cleveland. In 1899 he went with the Westinghouse Electric & Manufacturing Company, first in Pittsburgh and later in Philadelphia. His next office was with Ford, Bacon & Davis, of New York, where he remained five years; then with the Metropolitan Street Railway Company, of Kansas City, as vice-president and general manager of the operating company; also of the Kansas City Railway & Light Company, and Kansas City Electric Light Company. In 1907 he accepted the offices which he now holds in San Francisco. He is also a director in the United Railroads, and in the Sierra & San Francisco Power Company, of which he is vice-president. Mr. Black is a member of the American Institute of Electrical Engineers and is third vice-president of the American Electric Railway Association.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

SAN FRANCISCO*

SAN FRANCISCO, the largest city of the western half of the United States, is built at the upper end of a peninsula enclosing the southern part of a bay of the same name and is at the center of the long coast line of California. The city is nearly square in shape, about 7½ miles each way, with most of the streets running at right angles and the main business thoroughfare, Market Street, bisecting it from the northeast corner to the southwest. The city has a population of 420,000 and the railway lines serve about 450,000. Across the bay is Oakland, with a population of 225,000 and a string of populous towns on each side and at different points on the bay, all connected with San Francisco by an extensive system of ferries and steamboat lines and contributing a large amount of traffic to the lines which converge at the Ferry Building, foot of Market Street. At this point and at Third and Market Streets occur the greatest congestion during the rush hours, which are from 6 to 8.30 in the morning and from 4.30 to 6.15 in the evening. The congestion is severe all along Market Street through the business section, as it is the main artery of travel of the city and carries the bulk of the street car traffic. Parallel to Market and one block south is Mission Street, which is next in importance as a business and traffic thoroughfare and which turns after leaving the business district and traverses the populous central section known as the Mission and continues to a short distance beyond the southern boundary line; the Mission Street line extending the whole distance, about 7½ miles. Another long line, but nearer to the bay, serves this part of

* The twenty-ninth article of this series.



Reproduced from American Street Railway Investments by permission of McGraw Publishing Co.

the city; and running to Ocean Beach, on the west side, are several long lines. The development of the outlying portions of San Francisco is therefore chiefly in these directions, and while the city belongs to the peninsular class, it will be many years before the limiting effect of the peninsula is felt, and in the meantime the development will proceed on the radiating plan.

The topography of San Francisco makes the street railway problem about as difficult as it is in any large city in the country. Generally speaking, the residence district consists of a series of hills involving very steep grades. The business section of the city lies along the bay shore and is fairly level. These lines in the majority of cases require operation on grades all the way from 27% down. For this reason San Francisco was less inclined to take up electric traction than it might have

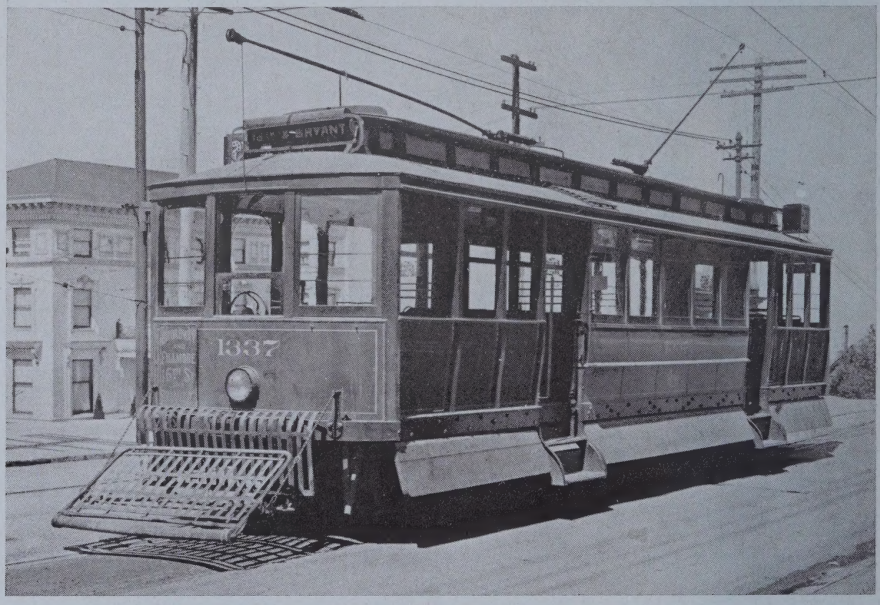
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Market Street near Third. This is the center of the most crowded part of the business district. Also the center of an area of four square miles destroyed by the fire and earthquake of April 18, 1906

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Loop within a loop at the Ferry Building, foot of Market Street. The multitudes which come and go daily across the bay pass through this building. Lines from all parts of the city converge here and the congestion is severe during the morning and evening rush hours

been otherwise. Cable roads, in spite of their expensive operation, were generally used up to the early nineties, and suburban traffic at that time was handled with small steam locomotives. Gradually a few crosstown lines, whose grades were not heavy, were equipped with electricity and the only interurban line down the peninsular to San Mateo was built. Naturally these conditions had a marked influence on the type of rolling stock. The early cable cars consisted of two parts, the small framework, carrying the cable grip—known as the dummy—followed by a small trailer. Subsequently the dummy and trailer were combined in the same framework, making substantially a double-truck car. When electrical operation commenced, a car, which has since been known as the California type, was developed. This consisted, generally speaking, of a central closed portion with two open ends. In some of the cars the open ends had transverse seats, and in some the transverse seats faced outward. This car, having double trucks, was simply a growth of the orig-

inal cable car idea, the climate of San Francisco being somewhat responsible for retaining the open sections. During eight or nine months of the year it is sufficiently mild for outside riding, as a matter of preference, though heavy fogs and sudden chill winds require a closed portion for some of the passengers.

With the great fire of 1906, a complete rebuilding of the



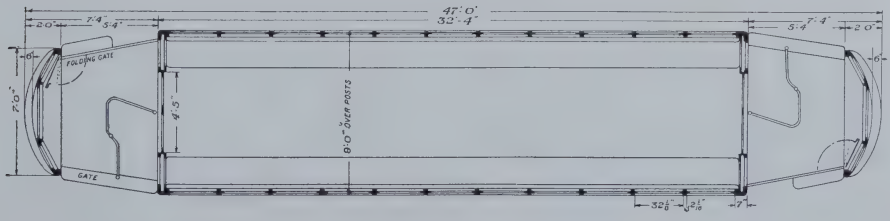
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. California combination open and closed car. This type originated in San Francisco in the early days of cable railways and was the standard car of the United Railroads prior to the fire

track within the burned area was necessary. While a gradual transition from cable to electric operation would probably have come about normally on account of the increased cost of operation of the cable road, the fire gave the opportunity for a complete change immediately. With an area of four square miles in ruins, the rebuilding was permanent and substantial. The total mileage of single track within the burned area was 60 operated by overhead trolley and 40 by cable. With the rebuilding, only two or three comparatively short

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Pay-As-You-Enter Car recently introduced. Eighty of these cars will be put in operation this year

lines were rehabilitated as cable lines, and these only because the grades were prohibitive from the standpoint of electric operation. The steepest grade in actual electrical operation at the present time is known as the Fillmore Street hill, which is two blocks long, 27%. This piece of track is operated, however, with a weight balance in addition to the trolley. There are in regular operation, without weight balance, grades several blocks long, 13%, and a block each, 14% and 16%.

As an item of interest, while the combined electric and cable system of the city is now up-to-date and well operated, it is a peculiar fact that there is at present practically every type of traction lines actually in service, with the exception of the old steam dummy, which originally carried suburban traffic. Owing to a franchise dispute, a short section



CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Plan of Pay-As-You-Enter Car. A folding gate closes the left side of the motorman's platform and a mechanically operated screen gate closes the exit on the right side

is still operated with horse cars. One short line, owing to property owners' dislike for overhead trolley, has the original cable dummy and trailer with cable operation. A few heavy grade lines are still operated with up-to-date double-truck cable cars, and the successive steps in types of traction and rolling stock are still represented up to the modern closed double-truck car arranged for fare prepayment.

With the exception of 11½ miles of cable railways of the California Street Cable Railroad, 7½ miles of the Geary Street Park & Ocean Railroad, also cable, and 8 miles of electric lines of the Presidio & Ferries Railroad, all the street railways are operated by the United Railways of San Francisco and consist of 261 miles electric and 14 miles cable. The United Railroads has three different types of cars which might be considered standard, *i.e.*, the California combination open and closed type which is operated on a number of the divisions; the cross-seat closed car, which is most prominent on

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Interior of Pay-As-You-Enter Car. The seating capacity is 48. The window sashes drop into covered pockets and the deck sashes are operated in pairs

the Market Street and tributary lines; and the new P-A-Y-E cars, of which the first lot were put in operation two months ago on the Sutter-Jackson Street and Cliff House lines, running across the northern part of the city. It is expected that there will be 80 of the latter cars in operation before the end of summer. The United Railways System has in all approximately 600 electric motor cars and 50 cable cars. The three other railway companies together have about 100 cars.

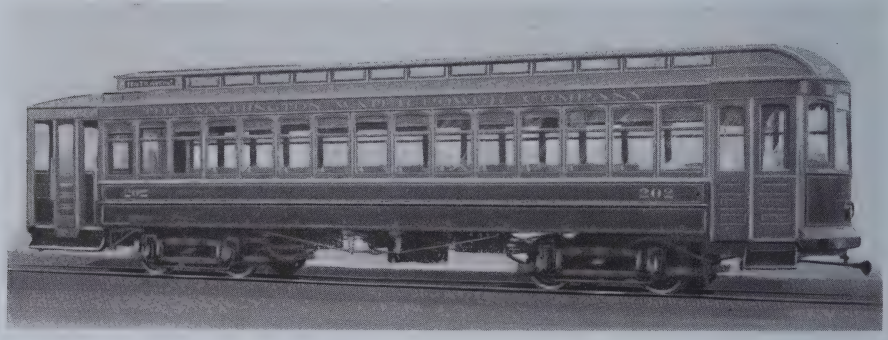
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE. Platform of Pay-As-You-Enter Car. The curved dividing railing is arranged to slide up out of the way, leaving the front platform unobstructed

The California type of car measures 37 ft. 2 in. over the dashers; the closed section is 13 ft. 2 in. long and the open section 12 ft.; width over sills, 7 ft. 10½ in., and over posts, 8 ft. 2 in.; height of steps, 14 in., 12 in., and 12 in.; seating capacity, 36; four 35 h. p. motors per car; weight of car and trucks completely equipped, 36,000 lbs. The cross-seat closed type is 32 ft. 4 in. over the body; 45 ft. 4 in. over platforms; length of platforms, 6 ft.; width over straight sides, 9 ft.; step heights, 15¾ in. and 10 in.; seating capacity, 44; four 50 h. p. motors per car; weight of a car and trucks completely equipped, 55,830 lbs. The Pay-As-You-Enter car dimensions are shown on the diagram on page 31.

LARGE PREPAYMENT CARS FOR SPOKANE, WASH.

INITIAL EQUIPMENT

THE Washington Water Power Company has just received 25 cars of the type illustrated, from The J. G. Brill Company, and will at once inaugurate the Pay-As-You-Enter system in Spokane. These are the longest closed prepayment cars that have been built for surface railways and



PREPAYMENT CARS FOR SPOKANE, WASH. The Pay-As-You-Enter System is being inaugurated in Spokane with 25 of these cars. Arranged for single-end operation. The cars are mounted on Brill No. 27-E1 trucks

measure 38 ft. over the body corner posts, 51 ft. over all, and have a seating capacity of 58. The diagram and photographs show that the cars have unusual features in the platforms both at front and rear; the principal novelty being sliding doors at the entrance and rear exit. These doors are practically of the same width and are operated by a pair of vertical levers which are fulcrumed in a casting on the floor at the right of the conductor. The levers can be operated singly or together and the movement is but 10 inches and requires comparatively little effort. Another lever fulcrumed at the lower part of the bulkhead, behind and at the left of the conductor, operates the exit door in the body end. The rear platform is provided with an emergency door, placed opposite to the

entrance. A folding step works in conjunction with the door. The three sashes at the end of this vestibule are arranged to drop into pockets. The Brill No. 3-C fare boxes which are used on these cars have all-steel cases and are equipped with four-compartment tills. The location of the fare box, dividing railing, door levers, etc., will be seen on the diagram.

PREPAYMENT CARS FOR SPOKANE, WASH. These are the first prepayment cars in which the entrance and exit doors are separated by a panel into which they slide. The doors are operated singly or together by a pair of levers. The fare box is the Brill No. 3-C type

Each side of the car body has 15 double-sash windows, with upper sashes stationary and lower sashes raising their full height. The deck sashes are operated in pairs, with single fixed sashes between each operating pair. The seats have stationary backs and pressed-steel pedestals. At the wall-end they come with-

PREPAYMENT CARS FOR SPOKANE, WASH. These are the longest closed prepayment cars which have ever been built for surface railways. Seating capacity, 58

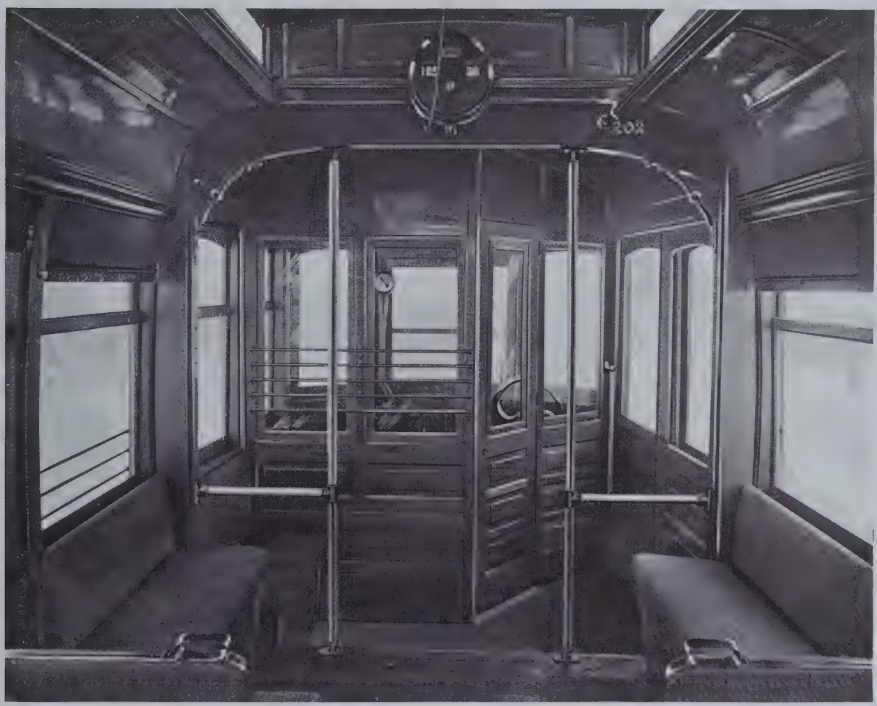
in the line of the window posts, as there are no window pockets, and thus save a few valuable inches on both sides. Ash is used for the interior finish and birch veneer for the ceilings.

A commodious cab is provided for the motorman at the front platform and space is left for a double seat at the left.

PREPAYMENT CARS FOR SPOKANE, WASH. The upper window sashes are stationary and the lower raise full height. The deck sashes are operated in pairs, with single fixed sashes between each operating pair

The omission of the bulkhead gives an open and attractive appearance to this end of the car. The exit door is controlled by the motorman, whose cab windows give him a clear view of passengers leaving. The window sashes at the left of the cab operate the same as in the car body and the front sashes drop into pockets. Brass rods protect the glass in the partition and three-bar guards extend along the windows on the left side of the car and are hinged to allow them to drop down.

The bottom framing of the cars is composed of 4 by 8¾-in. yellow pine sills with 15 by ⅜-in. steel plates on the inside and these plates reinforced with 2½ by 2½ by ½-in. angles. An inside truss rod of 2½ by ½-in. steel extends horizontally the length of 11 windows and at the second post from the corner posts is supported by two 1½ by 1½ by ½-in. angles,



PREPAYMENT CARS FOR SPOKANE, WASH. The motorman operates the front exit sliding door by a lever in his cab. The omission of the bulkhead gives an open and attractive appearance to this end of the car

secured to the sill plate and to the post, from which it turns down to the end of the side sill where it is anchored by means of a heavy casting. The undertrusses are of the usual type, braced with queen posts dropped from the two needle-beams. Channel steel knees support the platforms both at the side and at the center. The side posts of the body framing are 3¼-in. thick and the corner posts, 3⅝-in.; sweep of posts, 1¾-in. The cars are mounted on Brill No. 27-E

PREPAYMENT CARS FOR SPOKANE, WASH. Rear platform emergency door with mutually operating folding step

trucks with 6-ft. wheel base and 34-in. rolled steel wheels; the bolster centers are spaced 26 ft. apart.

The No. 27-E type of truck has been standard on the interurban lines of this system for many years, and the short-base truck, built on the same principles, is the standard truck of the city railway, excepting on certain long lines where high speeds are attained after leaving the city limits.

Cars for the city system of the Washington Water Power Company at Spokane were described in BRILL MAGAZINE of August, 1907, and of July, 1909. In the latter issue were also described and illustrated two types of interurban cars used in train service on the company's high-speed lines between Spokane, Medical Lake and Cheney.

The dimensions and weights of the new cars follow:

Length of body	38 ft. 0 in.	From step to platform	15½ in.
Length over platforms	50 ft. 4½ in.	From platform to car floor	8¼ in.
Length of front platform	5 ft. 6 in.	Seating capacity	58
Length of rear platform	6 ft. 10½ in.	Type of trucks	Brill 27-E1
Centers of side posts	2 ft. 6 in.	Motors	GE–80—4-40 h.p.
Width over sills	8 ft. 3½ in.	Weight of car body, less electrical equipment	25,000 lbs.
Width over posts	8 ft. 6 in.	Weight electrical equipment	1,500 lbs.
Extreme width	8 ft. 9½ in.	Weight air brake equipment	1,500 lbs.
From track to sills	2 ft. 10 in.	Weight of trucks	16,000 lbs.
From sills to trolley boards	9 ft. 5 in.	Weight of motors	11,200 lbs.
From floor to headlining	8 ft. 5¾ in.	Total weight	55,200 lbs.
From track to step	17⅛ in.		

MORE P-A-Y-E CARS FOR ILLINOIS TRACTION SYSTEM

SINGLE-TRUCK TYPE

THE Danville Car Company recently delivered 31 cars to the Illinois Traction System for use on the lines at Bloomington, Quincy, Galesburg and Decatur, Ill., and Topeka, Kan. The Danville Car Company furnished six double-truck P-A-Y-E cars to the Bloomington lines last year, and the American Car Company built 30 for the McKinley Bridge lines. The new single-truck cars are all the same excepting in the painting and are represented by the photographs of one of the Galesburg cars. As will be seen, they are double-end P-A-Y-E cars completely vestibuled and with entrance and exit doors in the body ends separated by a bulkhead into which both doors slide. Twenty-seven passengers are accommodated on the longitudinal seats and folding corner seat. The metal box against the bulkhead, which will be

MORE P-A-Y-E CARS FOR ILLINOIS TRACTION SYSTEM. Thirty-one of these cars have recently been furnished to six different lines of the system

MORE P-A-Y-E CARS FOR ILLINOIS TRACTION SYSTEM. The side windows have stationary upper sashes and lower sashes that drop into pockets. The seating capacity of the car is 27

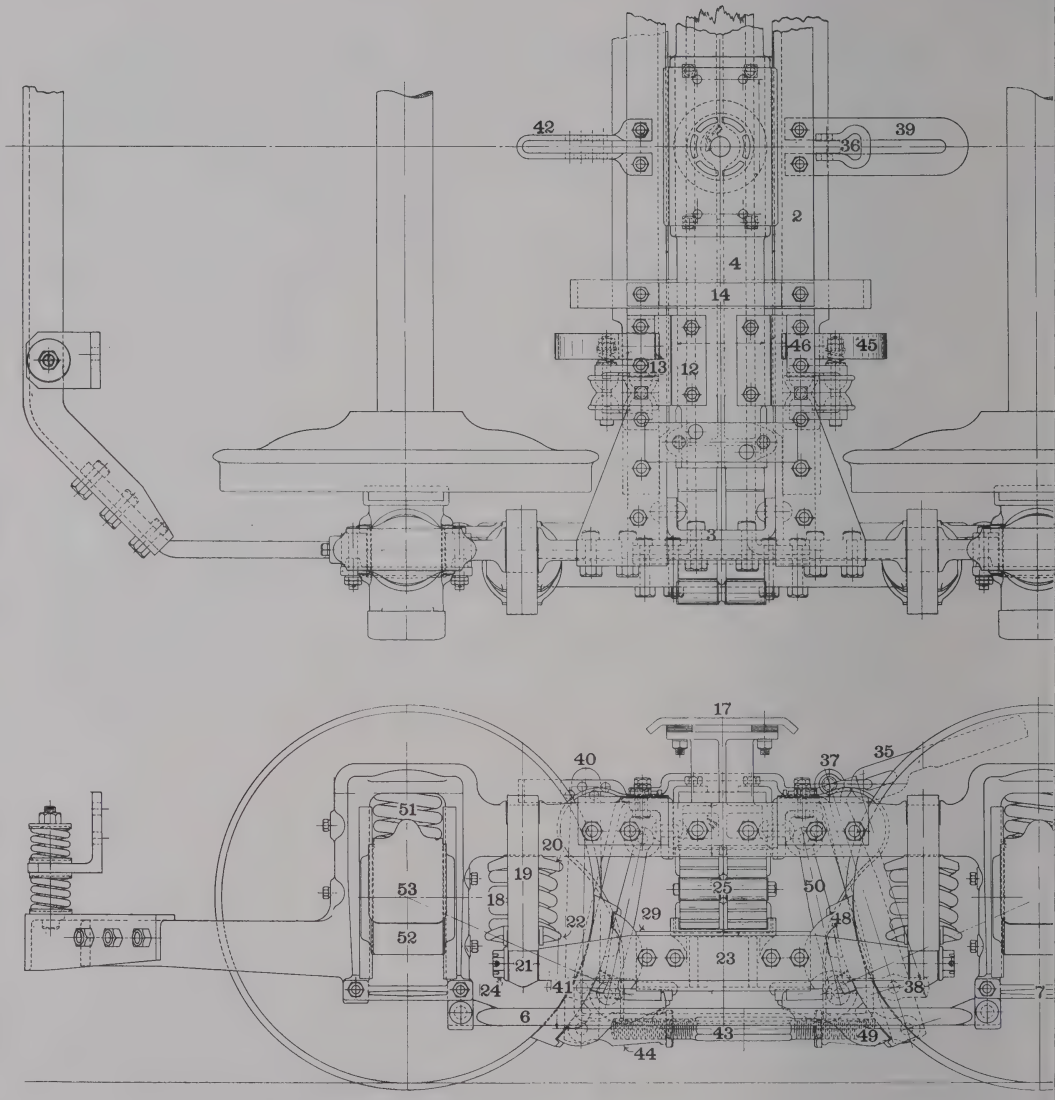
noticed in the photograph of the car interior, is the upper part of the sand box, located here as it is more convenient than under the seat and there is more room for the valve and hose under the frame at this point.

The entrance and rear exit doors are both hinged to a wooden upright midway of the platform step, and swing against the dividing railing which extends from this upright around to the bulkhead. The platform steps are of the regular stationary type. Extra heavy knees are used to support the platforms, and the framing throughout is unusually substantial.

Length of body	21 ft.	0	in.
Length over platforms	32 ft.	7	in.
Length of platforms	5 ft.	9½	in.
Centers of side posts		33	in.
Width over sills	8 ft.	2	in.
Width over posts	8 ft.	2	in.
Extreme width	8 ft.	4	in.
From track to sills		30¼	in.
From sills over trolley boards	9 ft.	5	in.
From floor to headlining	8 ft.	$4\frac{1}{16}$	in.
From track to step		15	in.
From step to platform		13	in.
From platform to car floor		10	in.
Seating capacity			27
Motors		GE-88—2-45	h.p.

BRILL No. 2

(PATEN

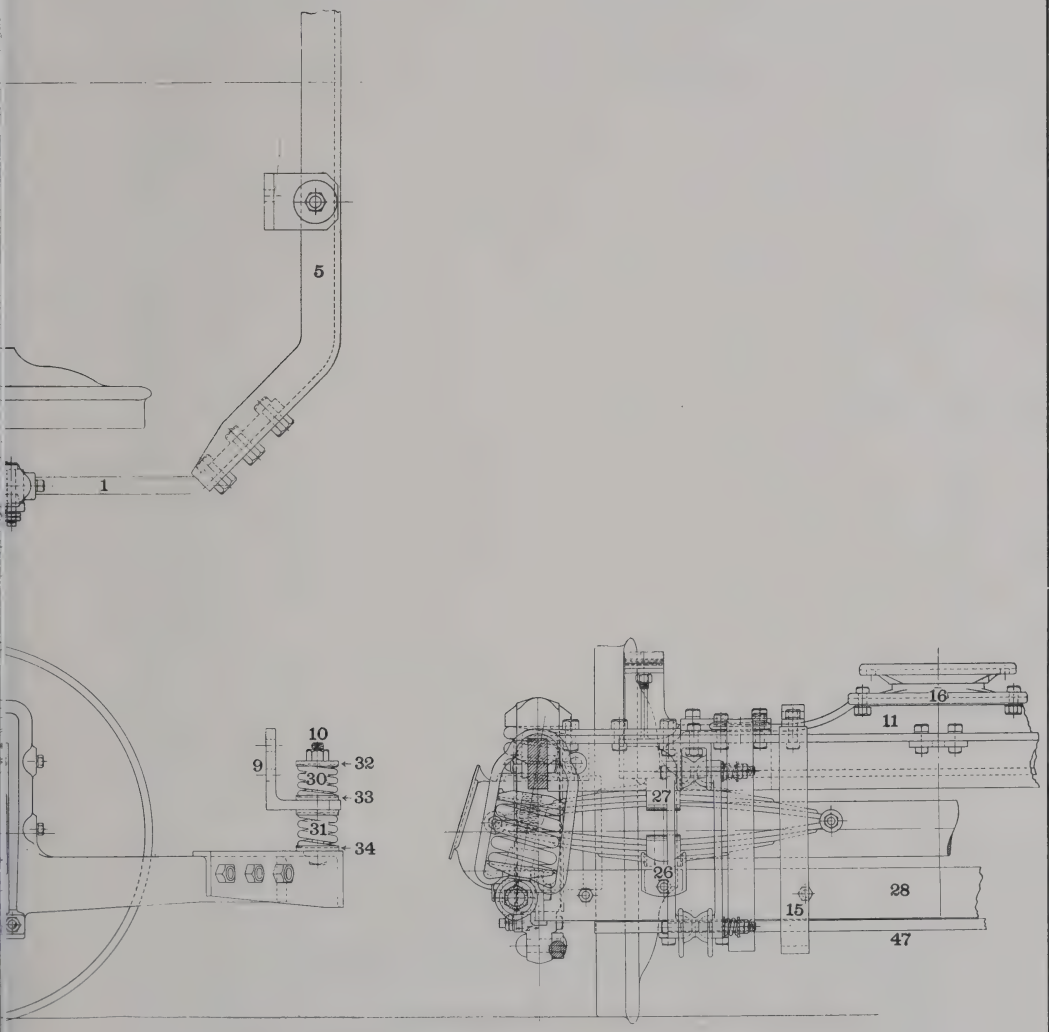


Names of Parts

1 Side Frame
2 Transom
3 Transom Corner Bracket
4 Transom Gusset Plate
5 End Frame
6 Pedestal Tie Bar
7 Pedestal Cap
8 Pedestal Gib or Wear Plate
9 Motor Suspension Bar
10 Motor Suspension Bar Bolt
11 Bolster
12 Bolster Chafing Plate
13 Transom Chafing Plate
14 Transom Tie Bar
15 Brake Beam Safety Hanger
16 Truck Center Plate
17 Side Bearing Wear Plate
18 Equalizer Spring
19 Equalizer Spring Link
20 Equalizer Spring Cap
21 Equalizer Spring Eye-Bolt
22 Equalizer Spring Seat
23 Equalizer or Equalizing Bar
24 Equalizer Nut
25 Bolster Spring
26 Bolster Spring Seat
27 Bolster Spring Cap
28 Spring Plank

7-F TRUCK

ED)



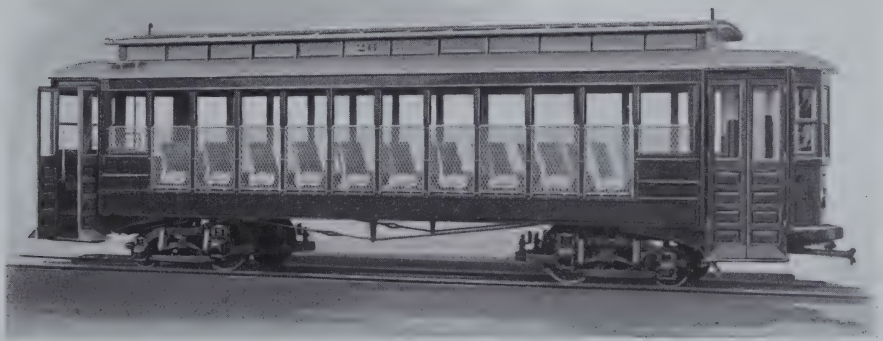
Spring Plank Carrier
Motor Suspension Spring (Top)
Motor Suspension Spring (Bottom)
Motor Suspension Spring Cap
Motor Suspension Spring Seat (Top)
Motor Suspension Spring Seat (Bottom)
Brake Rod
Brake Rod Clevis
Live Lever
Live Lever Fulcrum
Live Lever Guide
Dead Lever
Dead Lever Fulcrum
Dead Lever Guide

43 Bottom Truck Connection
44 Bottom Truck Connection Jaw
45 Brake Release Spring
46 Brake Release Spring Clip
47 Brake Beam
48 Brake Shoe
49 Brake Head
50 Brake Hanger
51 Journal Box Spring
52 Journal Box
53 Journal Box Lid

INTERESTING CARS FOR PORTO RICO

SINGLE-MOTOR TRUCKS

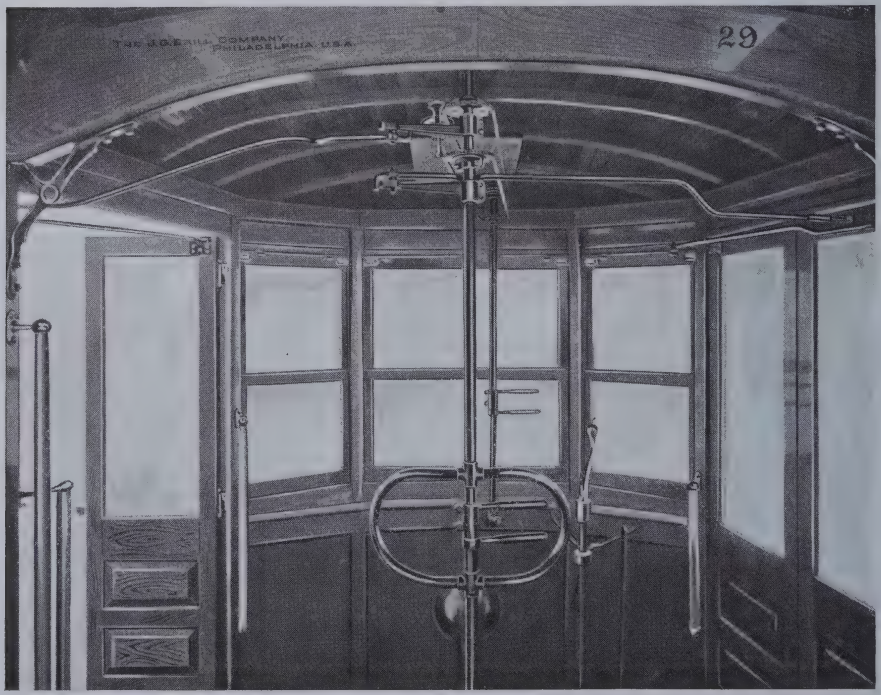
THE San Juan Light & Transit Company has lately added to its equipment ten center-aisle open motor cars built by The J. G. Brill Company. The cars are of the same type as originally furnished to the Third Avenue Railway, New York, and subsequently to City & Suburban Railway Co., Brunswick, Ga.; Lehigh Valley Transit Co., Allentown, Pa.; Charleston Consolidated Electric Railway Co., Charleston, S.C.; Consolidated Railways, Light & Power Co., Wilmington, N.C.; Yakima Valley Transportation Co., Yakima, Wash.; and Asheville & East Tennessee Railroad Co., Asheville. N.C. The cars for San Juan differ, however, from those furnished to the lines just mentioned, in that the sashes were omitted, as the climate of Porto Rico is mild during the winter and does not call for closed cars. If at any time it should be desirable to close the cars, sashes with panels can be easily obtained. It makes an ideal car for a warm climate, as it combines the advantages of a center-aisle car with those of the open type and eliminates the disadvan-



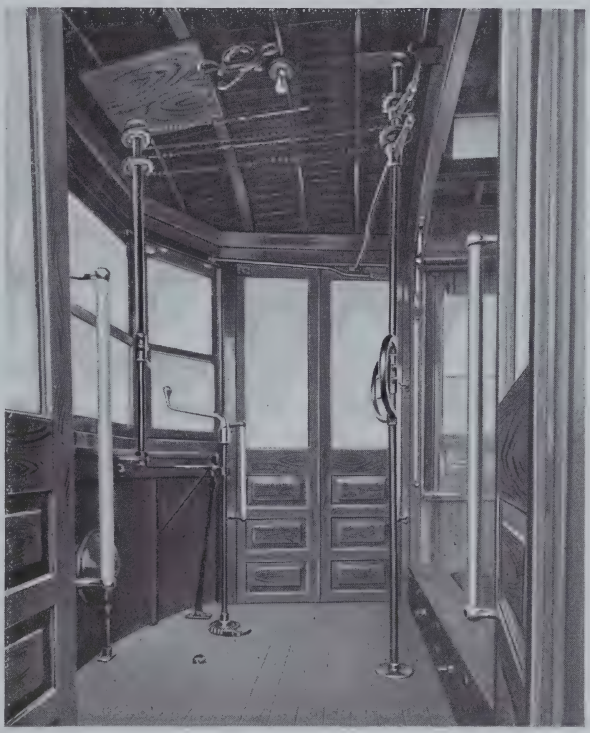
INTERESTING CARS FOR PORTO RICO. The climatic conditions of Porto Rico do not call for the winter equipment of panels with sashes usual to this type of car. The cars are mounted on Brill No. 39-E single-motor trucks

tages of the latter, especially in regard to the entrances. The wire screens along the sides form effectual guards and are not too high to obstruct the view of seated passengers. The vestibule doors, as reference to the photographs will show, are mechanically operated, and the arrangement is such that passengers can neither get off nor on the car until it has been brought to a stop. The platform step is also arranged to prevent persons from obtaining a foothold upon it when the doors are closed. Thus the type of car is one which is well equipped for preventing accidents.

The vestibule doors are of an unusual type and operated by an interesting mechanism. The arrangement is so well shown by the photographs that little description is necessary. The operation may be from handles located on the upright in the middle of the platform near the end sill and



INTERESTING CARS FOR PORTO RICO. While one leaf of the door is being pushed open by a long lever, the other leaf of the door is given a corresponding movement by a connecting rod



INTERESTING CARS FOR PORTO RICO. Sprocket wheels and chains connect the two sets of door operating handles

convenient to the conductor's position, or from handles on an upright at the center of the middle window convenient to the motorman's position. Either set of handles may be used by the conductor, as they are connected by sprocket wheels and chains and work in unison. The levers attached to the doors are overhead and out of the way; one long lever is connected with the leaf of the door which is hinged to the body corner posts, and this leaf is connected by a rod to the other leaf. Sufficient leverage is given to enable both handles to be operated at the same time if necessary to admit or let off passengers at terminals. As the platform steps are stationary, the lower ends of the vestibule doors are provided with sloping covers made of sheet steel, precluding any possibility of a foothold being gained upon the step when the doors are closed.

The seating arrangement provides for 48 persons, the seats being of the Brill Winner type with push-over backs, and both seats and backs made of maple slats; a bronze grab handle is provided at the corner of the back. Longitudinal seats for two passengers each are at each side of the car next

to the corner posts. The interiors are finished in ash and cherry, with the ceilings in car-line finish. Striped duck curtains, with battens 12 inches apart, are firmly held at the edges and prevented from being blown in or allowing rain to get into the car, by having a one-inch molding running along the edges of the half-inch grooves in which the curtains slide

INTERESTING CARS FOR PORTO RICO. The heavy duck curtains have battens 12 in apart and run in post grooves 1½ in. deep. The cars can readily be furnished with window sashes should it ever be desirable

forming a groove one and one-half inches deep on each side of the post. The screens which are used to guard the sides are galvanized instead of painted, for better protection against corrosion, and are securely fastened in place by three clamps screwed to each post. The cars are lighted by eight lamps inside the car, placed in a row down the center. A light on each platform and two lights with each electric sign

are connected in series with their respective circuits inside the car and controlled by the main snap switch and two-way transfer switch connected with both headlights and four lights inside the car, so that these lights may be thrown on in the direction in which the car is going. The vestibule front—that is to say, the three windows—is arranged to be removed in one piece; therefore with the vestibule fronts removed, and because there are no bulkheads, there is nothing to prevent a free rush of air through the cars, making them cool and attractive to pleasure riders during the hot season. However, the climate of Porto Rico is not as hot as might be imagined from the fact that the island is in the torrid zone. The temperature rarely reaches 90 degrees and the island is one of the most healthful places in the tropical section of the Western Hemisphere. In winter the temperature never falls below 50 degrees.

The bottom framing consists of 4½ by 7-in. side sills plated with 14 by $\frac{9}{16}$-in. steel plates, braced by 1⅛-in. undertruss rods. The pine members of the underframe are treated with creosote, and the oak framing and under side of the flooring with carbolineum. The cars are mounted on Brill 39-E type of single-motor trucks, having 33-in. driving wheels and 21-in. trail wheels with steel tires and cast steel centers. The trucks are equipped as usual with Brill half-ball brake hangers. Truck wheel base, 4 ft. 6 in.; diameter of axles, 4½ in. and 3⅞ in.; track gage, 4 ft. 8½ in.

The San Juan Light & Transit Company is owned by the Porto Rico Railways Company, Limited, which also owns the Porto Rico Power & Light Company and has developed the Comerio water power, 20 miles from San Juan. The power provided by the Comerio hydro-electric plant supplies the railway and lighting systems of San Juan, San Turce and Rio Piedras; also the lighting systems in Comerio, Bayamon, Cataño, Carolina and Caguas. The population served by the system is over 100,000.

Articles upon cars shipped to this system will be found in BRILL MAGAZINE of October, 1907, and February and August of 1908.

Length of body	30 ft.	0	in.
Length over platforms	39 ft.	0	in.
Length of platforms	4 ft.	6	in.
Centers of side posts	2 ft.	5	in.
Width over sills	8 ft.	2	in.
Width over posts	8 ft.	2	in.
Extreme width	8 ft.	5½	in.
From track to sills	2 ft.	7⅜	in.
From sills over trolley boards	8 ft.	11⅜	in.
From floor to rafters	7 ft.	11½	in.
From track to step		15⅛	in.
From step to platform		14½	in.

From platform to car floor	8⅝ in.
Seating capacity	56
Type of trucks	Brill 39-E
Motors	West. 306—2-50 h.p.
Wt. of car body, less elec. equipment	20,150 lbs.
Wt. of electrical equip.	1,500 lbs.
Wt. of air brake equip.	1,500 lbs.
Wt. of trucks	11,240 lbs.
Wt. of motors	5,750 lbs.
Total	40,140 lbs.

INTERURBAN CARS FOR THE FAIRMONT & CLARKSBURG TRACTION COMPANY

COMBINATION TYPE

AMONG the recent shipments from the plant of G. C. Kuhlman Car Company were four interurban cars mounted on Brill 27-E 1½ trucks for the Fairmont & Clarksburg Traction Company, of Fairmont, W. Va. A

INTERURBAN CARS FOR THE FAIRMONT & CLARKSBURG TRACTION COMPANY. Four of these cars were recently delivered to this railway system in the northern part of West Virginia. The cars are mounted on Brill No. 27-E 1½ trucks

description of express cars, built at the same plant and for the same company, was given in the March, 1911, BRILL MAGAZINE; in the April issue of 1908 single-truck cars of the Brill semi-convertible type were likewise described. This railway connects Fairmont, Monongah, Clarksburg, Adamston, Wilsonburg and Bridgeport, all of these towns being along the Monongahela River in the northern part of West Virginia. The system comprises 50 miles of standard gage track with 55 cars in operation, and the company furnishes power for lighting and manufacturing. The power plant is situated at Jayenn, on the river just above Fairmont, and is interesting on account of the remarkably low generating costs obtained by the use of turbines and the cheap fuel gas of high calorific value abundant in this region. The plant has a rating of 3,000 k.w. from four turbines.

INTERURBAN CARS FOR THE FAIRMONT & CLARKSBURG TRACTION COMPANY. The passenger compartment seats 36, and folding seats in the baggage compartment accommodate 16

The new cars are of the combination passenger and baggage type, seated for 36 passengers and arranged for double-end operation. The baggage rooms have folding seats, which increases the seating accommodation by 16. The cars are vestibuled at both ends and the platforms are dropped below the level of the floor and have entrances at each side. The entrances are provided with double steps, and folding trap doors cover the open space when the vestibule doors are closed. The windows are arranged to be raised their full height and have stops which hold them in any position. The arched tops of the twin windows are glazed with opalescent glass, as are also the ventilator sashes; curtains cover the arched as well as the lower part of the windows. Seats of Brill manufacture are used and have 22-in. backs, corner grab handles and pressed-steel pedestals. The underframing consists of 4 by 7¾-in. yellow pine side sills plated on the inside with 15 by ⅜-in. steel plates; 5¼ by 6⅞-in. white oak end sills; and 4½ by 5½-in. white oak cross joists. The under trusses are 1⅛ in. diameter. The corner posts of the body are 3⅝ in. thick and the side posts 3¼ in. Brill trucks of the No. 27-E1½ type are used under these cars and have a wheel base of 6 ft., and have 34-in. steel-tired wheels with 3-in. tread and 1-in. flange. The axles are American Electric Railway Association standard with 3¾ by 7-in. journals. The track gage is 4 ft. 8½ in., and the radius of the sharpest curve is 37 ft.

The principal dimensions and weights are as follows:

Length of body	34 ft. 4 in.	From track to step	15 in.
Length over platforms	43 ft. 9 in.	From step to platform, 12½ in. and 12½ in.	
Length of platforms	4 ft. 8½ in.	From platform to car floor	5½ in.
Length of baggage comp.	9 ft. 2 in.	Seating capacity	36
Centers of side posts	2 ft. 8½ in.	Type of trucks	Brill 27-E 1½
Width over sills	8 ft. 6 in.	Motors	West. 306—4-50 h.p.
Width over posts	8 ft. 6 in.	Wt. of car body with elec. equipment	23,260 lbs.
Extreme width	8 ft. 7¾ in.	Wt. of trucks	17,120 lbs.
From track to sills	3 ft. 1¾ in.	Wt. of motors	11,500 lbs.
From sills over trolley boards	9 ft. 6¼ in.	Total weight	51,880 lbs.
From floor to headlining	8 ft. 5 in.		

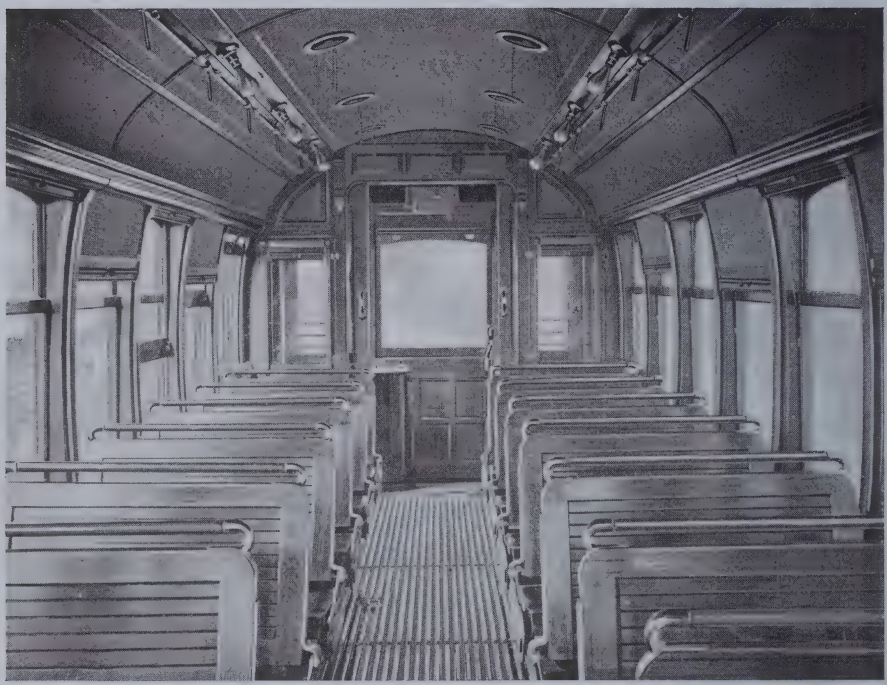
SINGLE-TRUCK TYPE FOR COFFEYVILLE, KAN.

BRILL PLAIN ARCH ROOF

THE illustrations show an interesting type of single-truck car recently built by the American Car Company for the Union Traction Company of Coffeyville, Kan. This type of car has a Brill plain arch roof, with Brill

SINGLE-TRUCK TYPE FOR COFFEYVILLE, KAN. Thirty-two-passenger Brill Semi-Convertible Car. Mounted on Brill No. 21-E Truck

semi-convertible windows. As will be seen from the photographs, the appearance is very attractive both from the inside of the car and from the outside. Twelve ventilators of the Star type furnish ample exhaust when the car is carrying its maximum load. The ceiling is of birch veneer painted and striped, and this, with the excellent light arrangement, gives an unusually pleasing effect to the interior of the car. Six transverse reversible seats and two longitudinal stationary corner seats on each side of the aisle furnish accommodation for thirty-two passengers. The seats have pressed steel one-piece pedestals, pressed steel aisle and wall plates, angle-iron frames, and wooden slat backs and seats. The interior is fin-



SINGLE-TRUCK TYPE FOR COFFEYVILLE, KAN. The Brill Plain Arch Roof increases the head room, allows the window openings to be higher and reduces the weight

ished in golden oak, with oak doors and window sashes. The side sills are of long leaf yellow pine, 3⅜ in. by 5 in., reinforced with 5 by 3½ by ⅜-in. angles; end sills are of white oak, 3⅛ by 8⅝ in.; crossings, 3¼ by 4¾ in.; corner posts, 3¾ in. thick; side posts, 3¼ in.; sweep of posts, 1¾ in. The truck wheel base is 8 ft.; wheel diameter, 33 in.; tread, 3 in.; flange, 1 in. Brill draw bars, angle-iron bumpers, platform gongs, sand box, seats and other patented specialties are used.

Length of body	20 ft. 8 in.	From floor to headlining	7 ft. 6½ in.
Length over platforms	30 ft. 1 in.	From track to step	$13\frac{9}{16}$ in.
Length of platforms	4 ft. 8½ in.	From step to platform	$13\frac{1}{16}$ in.
Centers of side posts	2 ft. 5 in.	From platform to car floor	$7\frac{13}{16}$ in.
Width over sills	7 ft. 9½ in.	Seating capacity	32
Width over posts	8 ft. 2 in.	Type of trucks	Brill No. 21-E
Extreme width	8 ft. 8 in.	Motors	West. 101-B
From track to sills	2 ft $3\frac{7}{16}$ in.	Total weight (approx.)	25,000 lbs.
From sills over trolley b'ds	8 ft. 8 in.		

MORE P-A-Y-E CARS FOR WICHITA FALLS, TEX.

BRILL No. 27-GE1 TRUCKS

FOUR handsome cars of the Pay-As-You-Enter type were lately delivered to the Wichita Falls Traction Company, Texas, by the American Car Company, supplementing Pay-As-You-Enter cars of long open type which were described in BRILL MAGAZINE of July, 1910. The cars are somewhat longer than usual for a double-truck prepayment type, being 34 ft. over the body and having a seating capacity of 40. The bottom framing consists in the main of 3¾ by 6½-in. side sills reinforced with 15½ by ⅜-in. steel plates, having 2½ by 2½ by ½-in. angle iron riveted to the top and 6 by 3½ by ⅜-in. angle iron riveted to the bottom, giving the construction the characteristics of a Z-bar. The end sills are of oak 5¼ by 6⅞-in., reinforced with 6 by ½-in. steel plates, which plates are bent at right angles at each end and bolted to the side sills. The cross sills, also of white oak, are supported and held in place by special socket castings riveted to the steel sill plates. At each cross sill a ¾-in. tie rod is placed, which has a washer countersunk on the outside

MORE P-A-Y-E CARS FOR WICHITA FALLS, TEX. These cars measure 34 feet over the body corner posts and seat 40 passengers

of each side sill. The platforms are supported by two 8 by 3 by 3 by ½-in. Z-bars, which are reinforced with 7 by ⅝-in. plates riveted to the web. The interiors are finished in cherry, including doors and window sashes, and the headlinings are of birdseye maple veneer. There are 12 windows on each side of the car, with the upper sashes stationary and shaped to

MORE P-A-Y-E CARS FOR WICHITA FALLS, TEX. The window system is the Stephenson Semi-Convertible type, in which the upper sashes are raised into shallow pockets and the lower sashes are dropped into pockets in the side walls

give the effect of the windows being in pairs. The lower sashes drop into pockets provided with hinged covers. The Brill Winner type of seat is used and is furnished with corner grab handle and a socket for a sign lettered "For Colored." There are 16 transverse seats and four 36-in. longitudinal seats. The aisle is 29 in. wide. The bulkheads are furnished with two doors which slide into a pocket in the center, the entrance door in each bulkhead having a lever by which the conductor can open the door while standing in his position

back of the dividing railing. The entrance side of the vestibule has a two-section door hinged to a central post and arranged to close against the vestibule corner post, and will either open flat against the dividing rail or fold between the door post and end of the rail. A swinging door at the exit, hinged to the same post, also swings back against the dividing rail. The double leaf entrance door has a bronze swinging hand rail, similar to those used on Pullman car vestibule doors, which pivots on the door post and latches in a socket on the dividing rail. The front exit has a sliding door of the usual type which is operated by a lever mechanism. The platform steps at front and rear operate in conjunction with the doors.

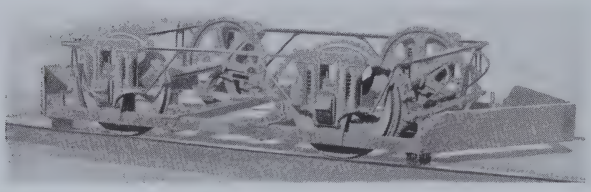
Length of body	34 ft. 0 in.	From sills over trolley b'ds	9 ft. 2 in.
Length over platforms	49 ft. 4 in.	From floor to headlining	8 ft. 0 in.
Length of platforms	7 ft. 8 in.	From track to step	16⅝ in.
Centers of side posts	2 ft. 8½ in.	From step to platform	13½ in.
Width over sills	8 ft. 1¾ in.	From platform to car floor	9¼ in.
Width over posts	8 ft. 9 in.	Seating capacity	40
Extreme width	9 ft. 0 in.	Type of trucks	Brill 27-G1
From track to sills	32½ in.	Motors	West. 101-B

A HISTORY OF THE J. G. BRILL COMPANY

JAMES RAWLE

V

THE early nineties were busy years in the street railway field, as city systems in all parts of the country were being electrified and capital was readily obtainable for such undertakings. During these years much of our attention was given to the development of electric motor trucks. The first type was produced early in 1888 and, as the illustration shows, was an adaptation from the horse car running-gear. This simple affair was the basis of an entirely new art —that of electric motor truck building—and the starting point of the mechanical success of electric traction. Several hundred of these trucks were built and gave good service. It is



Brill Truck No. 1, built in 1888. The art of electric motor truck building commenced with this truck, as it was the first to have an independent frame for motors

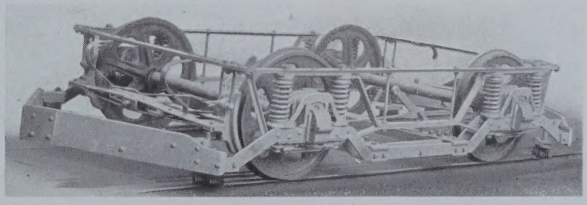
an interesting fact that the method of motor suspension adopted with this first truck has continued to this day in universal practice. Among the changes which quickly followed, and which were destined to be permanent features in this type of truck, were the abandonment of the enclosed pedestal springs and the adoption of spring posts. This necessitated the use of post stays, or lower chords, which, before the use of solid side frames, were trussed to the upper chords; the journal boxes were constructed with cars which carried the springs as in the old horse-car method; the base of each box was rigidly connected with the side frames, but this method did not give sufficient stability to the support of the car body, nor was there enough strength in the connection between the frames and the boxes to keep the truck square. It had appeared necessary to preserve the continuity of these side bars. Experience proved that the boxes must work in jaws which must be an integral part of the side frames. This step was a radical departure which embodied the correct principles of all truck construction, namely, the independent frame, which in addition to carrying the motors, must keep the boxes and axles in parallel relation; in other words, the squareness of the truck must depend upon the truck frames. The axle box yokes in the side frames were necessary not only for truck squareness, but also to permit the body of the truck to be lifted off the axles so that the motors might be inspected and repaired in pits.

The early motors were arranged to be carried low; therefore the side frames were also carried low. Soon motors were constructed that could be carried higher, and, what was of supreme importance, were completely encased. The encasing

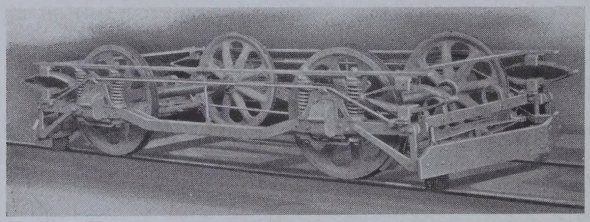
of the motors, protecting them from moisture and dirt, was immensely important to the general use of electric motor cars, since it removed one of the chief obstacles. The motor supports were wholly depended on to connect one side frame rigidly with the other. The heavy motors that came into use with the use of larger car bodies brought too much stress upon these center crossings; therefore independent motor supports were placed upon the frame and straight crossings were used at the centers between the wheels and also at the ends of the frames outside the wheels.

A serious difficulty, which for a long time baffled all attempts to overcome, was the bounding motion, or oscillation, of the car body. There was evidently something wrong with the spring system. We were the first to recognize that the difficulty lay in the fact that the rail joints produced a rhythmic motion in the coil springs; we therefore introduced slower acting elliptical springs. It was necessary to lengthen the extensions and mount the elliptical springs on the extensions, thus breaking the rhythm set up by the coil springs, and to a large extent preventing oscillation. At the same time the elliptical springs extended the spring base. Later on the full-elliptical springs were superseded by semi-elliptics, which still further extended the spring base and were slower acting.

While the single-truck was being developed, the necessity for longer car bodies arose, requiring pivotal trucks. The height of cars could be little increased, space between the tracks could not be widened, and the radii of curves must remain practically the same as before. How to find room for double-trucks to radiate under narrow cars was the problem. Little

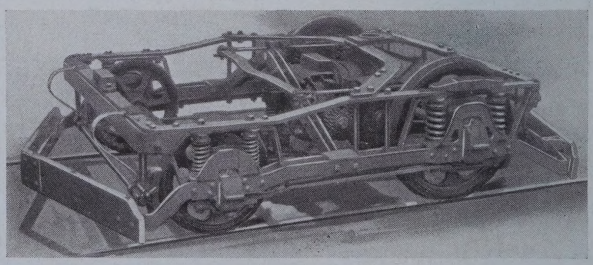


Brill Truck No. 6, built in 1889. The frame of this truck included journal yokes, which was a long step in the progress of truck construction



Brill Truck No. 13, built in 1890. The first truck to have plate springs in addition to coil springs. This feature soon became universal, as it largely overcame the oscillation of the car body

was to be learned from steam road practice; the limitations of operating on streets made the case entirely different, requiring the evolving of new principles of construction throughout. To give room for the motor and to allow the trucks to be located near the ends of the car body, and yet to avoid the steps and sills, were the reasons for placing the bolster out of center in the first pivotal truck which was built. This resulted in loss of traction, as the motor was applied to the wheels carrying the smaller proportion of the load; it was, in fact, a true "minimum-traction" truck. The advantage of having ample tractive power was quickly discovered, and the next type was the "maximum-traction" truck—the first of its kind, unique in idea and design, the truck consisting of a pair of ordinary-sized driving wheels and a pair of pony wheels with the weight eccentrically distributed, so that the large wheels carried nearly all of the load, the pony wheels bearing just enough to enable them to guide on the track. This truck was invented by John A. Brill and was introduced in 1890. After various modifications were made, the truck came into large use both at home and abroad, and today, under the name of the "single-motor" truck, is the leading truck in the city railway field. [TO BE CONTINUED]



Brill Truck No. 11, built in 1890. This was the first "maximum-traction" which, after a number of changes, became the most largely used truck in city railway service, and today, as the "single-motor" type, holds the leading place

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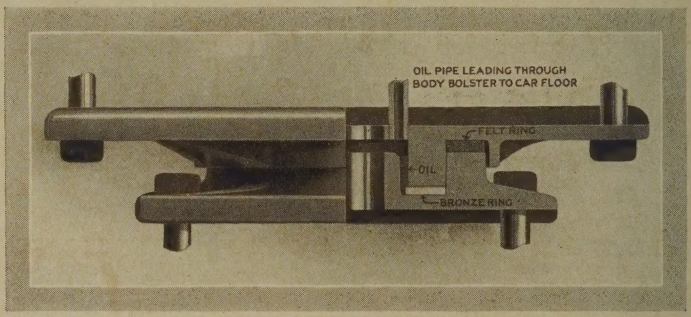

BRILL OIL-RETAINING CENTER BEARING

This center bearing is now used almost exclusively on Brill pivotal trucks. A phosphor bronze ring placed in the bottom of the lower plate receives the wear, and as this ring is constantly in a bath of oil and the oil is protected from dust and dirt by a felt ring, the wear is reduced to a minimum and the lubrication is perfect. The oil reservoir holds from one-third to one-half pint, according to size of bearing, and the oil is replenished through a pipe leading up through the car floor. Lubrication by grease is unsatisfactory as the grease does not get under the wearing surface sufficiently. The Brill Center Bearing was devised to overcome this defect and to avoid the use of roller and ball bearings with their liability to flattened rollers and pitted ball races.

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